



**WINTER- 14 EXAMINATION**

Subject Code:0807

**Model Answer**

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**Important Instructions to examiners:**

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.



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**Q.1 Answer any ten of the following question: (2 marks each)**

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**a) Define the term 'Antiseptics' and 'Disinfectants'. (1 mark for each definition)**

Antiseptics: Antiseptics are chemical sterilizing substances which are used to kill pathogenic microbes or for prevention of their growth OR to prevent the sepsis.

Disinfectants are the substances which are used to make a surface free from pathogenic organisms but these substances are applied only on inanimate objects. OR These are the substances which kill the bacteria as well as their spores.

**b) Define the term cardiotonics. Give the biological source with family of any one cardiotonic drug. (1 mark for definition, 1 mark for biological source with family)**

The drugs which give strength (energy) and increase the activity of heart muscles are called as Cardiotonics.

Biological source with family of either digitalis or Arjuna Bark

1. Digitalis:

Biological Source: It consists of dried leaves of Digitalis purpurea.

Family: Scrophulariaceae.

2. Arjuna:

Biological Source: It consists of dried stem bark of Terminalia arjuna

Family: Combretaceae

**c) Which part of the plant is used as a drug in case of :( 1/2 mark for each)**

i) Ergot: Dried sclerotium ii) Rauwolfia: Dried roots iii) Black catechu: Dried aqueous extract

iv) Indian bdellium: Oleo- gum resin



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**d) Mention synonym of following crude drug: (1/2 mark for each)**

- i) Beeswax: Cera –flava, yellow bees wax (any one)
- ii) Ephedra: Ma-Haung
- iii) Datura: Thorn apple leaves
- iv) Turmeric: Indian saffron, Haldi, Haridra (any one)

**e) Mention two examples of drug for which each of the following part are used (1/2 mark for each example)**

- i) Dried Juice: Aloe, kino, (any two) )
- ii) Dried aqueous extract: Catechu, Agar, Gelatin (any two)

**f) Write minimum four characteristic features of umbelliferous fruits. (1/2 mark for each characteristics feature)**

The fruits which belong to the family Umbelliferae are called as Umbelliferous Fruits.

E.g. Fennel, Coriander, ajowan, dill and caraway.

**(Any four of the following can be mentioned)**

Organoleptic characteristics:-

- 1.Schizocarp (splliting fruits)- Dry fruits that splits at maturity into 2 portions.
2. Mericarp- Each portion of Schizocarp (cremocarp) is called as mericarp.
3. Each mericarp shows two surfaces i.e. dorsal and ventral
4. Two mericarp join together by a stalk like structure called as carpophore
5. Primary ridges are 5 or more runs from apex to base.



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6. Below each primary ridges vascular bundles are present.
7. Each mericarp has a stylopod at the apex.
8. Number of vittae and arrangement of it is also a characteristic feature of umbelliferous fruits.
9. Each mericarp contains 6 vittae- 4 on dorsal and 2 on commissural surface in case of fennel.
10. All umbelliferous fruits contains Volatile oil.

**g) Write four differentiating points between organised and unorganised crude drug. ( Any four diffrentiating points can be mentioned,1/2 mark for each point)**

Organized crude drug	Unorganized crude drug
<ol style="list-style-type: none"><li>1. It is obtained from definite anatomic parts of the plants such as flowers, leaves, fruits etc</li><li>2. It is made up of definite tissue and cell.</li><li>3. It is solid in nature</li><li>4. Microscopical characters are used for identification.</li><li>5. Botanical and zoological terminology can be used to describe the drug</li></ol> <p>Ex. Coriander , fennel, datura, etc</p>	<ol style="list-style-type: none"><li>1. It is obtained from plants or animals by means of physical process such as drying ,, incision ,extraction such as juices ,resins.</li><li>2. It does not have cellular structure.</li><li>3. It is solid, semi-solid and liquid in nature.</li><li>4. Chemical tests and physical standards are used for identification.</li><li>5. Botanical and zoological terminology is inadequate. To describe these drugs, physical characters such as solubility, optical rotation, refractive index are used.</li></ol> <p>Ex. Aloe , bees wax, tragacanth, asafoetida</p>



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**h )Name the drug which contain following active chemical constituents : (1/2 mark for each)**

- i) Lysergic acid: Ergot
- ii) Asaresinolannol : Asafoetida
- iii) Brucine: Nux- vomica
- iv) Reserpine: Rauolfia

**i) Name any one drug which belongs to following family, :( 1/2 mark for each)**

- i) Rutaceae: Lemon, Orange
- ii) Burseraceae: Guggul, Myrrh
- iii) Apidae: Honey, Bees wax
- iv) Lauraceae: Cinnamon

**j) Which chemical substances is responsible for pungent taste of: (1 mark for each)**

- i) Ginger: Gingerol
- ii) Ajowan: Thymol

**k) Describe contribution of following persons in development of Pharmacognosy**

i) Hippocrates: The great physician Hippocrates (460-360 B.C.) known as 'Father of Medicine' dealt with anatomy and physiology of human beings, particularly with circulatory system & nervous system. He prepared famous oath for physicians, which is still taken by the physicians. He is honoured by giving the tital 'Father of medicine'. (1 mark)

ii) Galen: Galen(131-200AD) was Greek pharmacist; he worked on extraction of chemical constituent from the plants. He developed various methods of extraction therefore the branch of pharmacy which deals with extraction of chemical constituent from plants & animals is called as



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Galenic Pharmacy. He also described various methods of formulation of plant and animal drugs. (1 mark)

**1) Write two chemical tests for identification of Nux-vomica (1 mark each)**

Chemical test:

It contains strychnine and brucine.

Test for strychnine:

Strychnine + ammonium vanadate in  $H_2SO_4$  (mandelin's reagent) give violet color.

Test for brucine:

Brucine + nitric acid give yellowish- red color.

**e) Life cycle of ergot (diagram 2marks & explanation 2 marks)**

Stages of life-cycle are as

i) Over wintering stage

ii) Stage of sexual reproduction    iii) Stage of asexual reproduction

The sclerotia are produced in late summer. They fall on the ground in autumn. When the favourable conditions for germination are available, these sclerotia germinate in the spring to produce purple coloured stalks which on further growth form flattened spherical cavities known as perithecia. Each perithecium contain several asci. Each ascus contains eight threads like ascospores. Ascospores come out & get dispersed by air. The dispersal of ascospores takes place at time of flowering of rye plant. Ascospore become entangled with the stigma of host & produce mycelia which penetrate through ovary. The mycelia give rise to conidia, produced from the surface of ovary. Honey –dew attracts insects, along with it conidia are carried from one place to another by insects & is known as honey –dew stage.

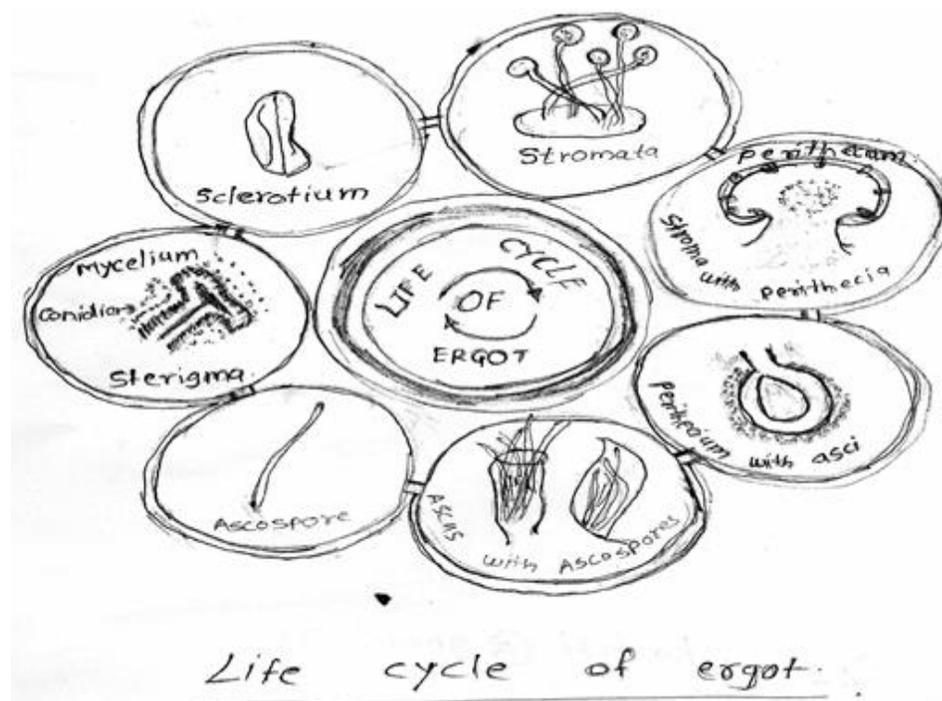
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In second stage , hyphae penetrate deeply into the ovary & develop into mass covering entire ovary which results in formation of elongated sclerotium & known as sclerotium stage. Sclerotium develops , attains maximum size & falls on ground and the cycle begins.



### b) Method of preparation of absorbent cotton (4 marks)

Fruits (capsules) are 3-5 celled, which contain numerous seeds..

Seeds covered with hair,, known as Balls..Balls are collected,, dried & taken to ginning press,, where in trichomes are separated from seeds.Raw cotton obtain from above is subjected to a process called combing. This saperates the long and short fibres .The long fibres are spun and woven as cloth and short fibres are called linters. This is used for manufacturing of absorbent cotton.



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Remove impurities (vegetable debris) from raw cotton

To remove wax,, fatty material & colouring matter,,raw cotton is taken to the machine,cotton opener & followed by treatment with dil. Soda solution or soda ash solution under pressure for about 10-15 hrs..Washed with water & treated with suitable bleaching agent..Again washed,, dried & make a flat sheet..Finally packed in paper wrappers & sterilized.

**c) Name the drug which is used as antimalarial. Write biological source with family and chemical constituents of it.(1 mark for mentioning name of the drug,1 ½ mark for biological source with family and 1 ½ mark for chemical constituents**

Cinchona

Biological source. - It consists of the dried bark of cultivated trees of Cinchona calisaya, Cinchona ledgeriana, Cinchona officinalis, Cinchona succirubra Family – Rubiaceae

Chemical Constituents-

Alkaloids- quinine, quinidine, cinchonine, cinchonidine

Glycosides- quinovin, cinchofulvic, cinchotannic & quinic acids.

cinchona red, tannins, calcium oxalate & starch.

**d) Define adulteration and substitution. (1 mark for each definition) Write the adulterants of (1/2 mark for each) i) Clove: ii) Digitalis:**

Adulteration: Adulteration is the debasement of an article/ Adulteration is substituting the original crude drug partially /completely with other similar type of drug.

Substitution: It involves total replacement of original drug with totally different substance, contains same type of active chemical constituents but at a lesser extent.



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i) Clove: (Any two)

Mother clove, Blown cloves, Clove stalks, Exhausted cloves.

ii) Digitalis: (Any two)

Verbascum Thapsus, Primula vulgaris(primrose leaves), Symphytum officinale(comfrey leaves)

**Q. 3 Attempt any three of the following;**

**a) Define resin. Give the name, synonym and biological source of drug which contain  $\Delta^9$ THC in it.(Definition 1 mark, Name & synonym each carries 1 mark, Biological Source for 1mark)**

**Ans.** Definition of Resin- Resin are amorphous products of complex chemical nature, obtained from natural or synthetic origin. Chemically they contain mixtures of essential oil, oxygenated products of terpene, carboxylic acids, alcohol, ester, etc.

Drug name which contain  $\Delta^9$ THC is Cannabis.

Synonym: Indian hemp, Ganja, Marijuana, Cannabis indica.

Biological source: Cannabis consist of dried flowering tops of the cultivated female plants of Cannabis sativa Linn. belonging to family Cannabinaceae.(Moraceae).

**b) Give minimum two differentiating chemical tests in between( Each differentiating test carry 1 mark)**

**i) Sumatra benzoin and siam benzoin**

**Ans.-** Test 1) 0.25 gm of benzoin add 5ml of solvent ether and decant 1ml of the ether solution into a porcelain dish and add to it 2 drops of H<sub>2</sub>SO<sub>4</sub>.



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A deep reddish brown colour is produced in case of Sumatra benzoin.

While A deep purplish red colour is produced in case of Siam benzoin.

Test 2) On heating benzoin in a test tube with 10ml solution of potassium permanganate.

Develops a strong odour of benzaldehyde in case of Sumatra benzoin.

Test 3) Heat benzoin in dry Test tube covering with glass slide. Observe the same slide under microscope . Cinnamic acid crystals are observed in case of Sumatra benzoin.

Test 4) To alcoholic solution of Benzoin, add alcoholic solution of  $FeCl_3$ . Siam benzoin gives green colour.

**ii) Black catechu and Pale catechu**

Test 1) Gambier fluorescin test- Boil a little powdered drug with alcohol, filter and add solution of NaOH. Stir and add few ml of light petroleum. Petroleum layer shows green fluorescence in case of pale catechu. This test is negative in black catechu.

Test2) Heat powdered drug with 5ml of  $CHCl_3$  in a dish & filter. Evaporate the filtrate on water bath. A greenish yellow residue is left due to the presence of chlorophyll in pale catechu. This test is negative in black catechu.

**c) Explain different means of adulteration of crude drug with suitable examples.( Each method with example carry 1 mark.)**

**Ans-** Adulteration is the debasement of an article.

**Methods of Adulteration :**

**1. Replacement by exhausted drugs**

Ex.1.Exhausted saffron is coloured artificially

2.Exhausted Ginger is mixed with starch & coloured.



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**2.Substitution with superficially similar but inferior drugs**

Ex.1. Adulteration of cloves by mother cloves.

2. Saffron with dried flower of carthamus tinctorius.

**3.Substitution by artificially manufactured substituent**

Ex.1. Paraffin wax is tinged yellow & substituted for yellow bees wax.

2. Artificial invert sugar is mixed with honey.

**4.Substitution by sub- standard commercial varieties**

Ex.1. capsicum frutescens( capsicum minimum), substituted by capsicum annum.

2. Alexandrian senna with Arabian senna.

3. Strychnos nux-vomica adulterated with Strychnos nux-blanda/ S. potatorum seeds.

**5. Presence of organic matter obtained from the same plant**

Ex.1. clove are mixed with clove stalks.

2. Caraway & Anethum fruits are mixed with other parts of inflorescence

**6.Synthetic chemical**

Ex.1. Benzyl benzoate to balsam of peru.

2. Citral to oil of lemon grass.

**7.Waste from market**

Ex.1. Limestone in asafoetida.

2. Pieces of amber coloured glass in colophony.

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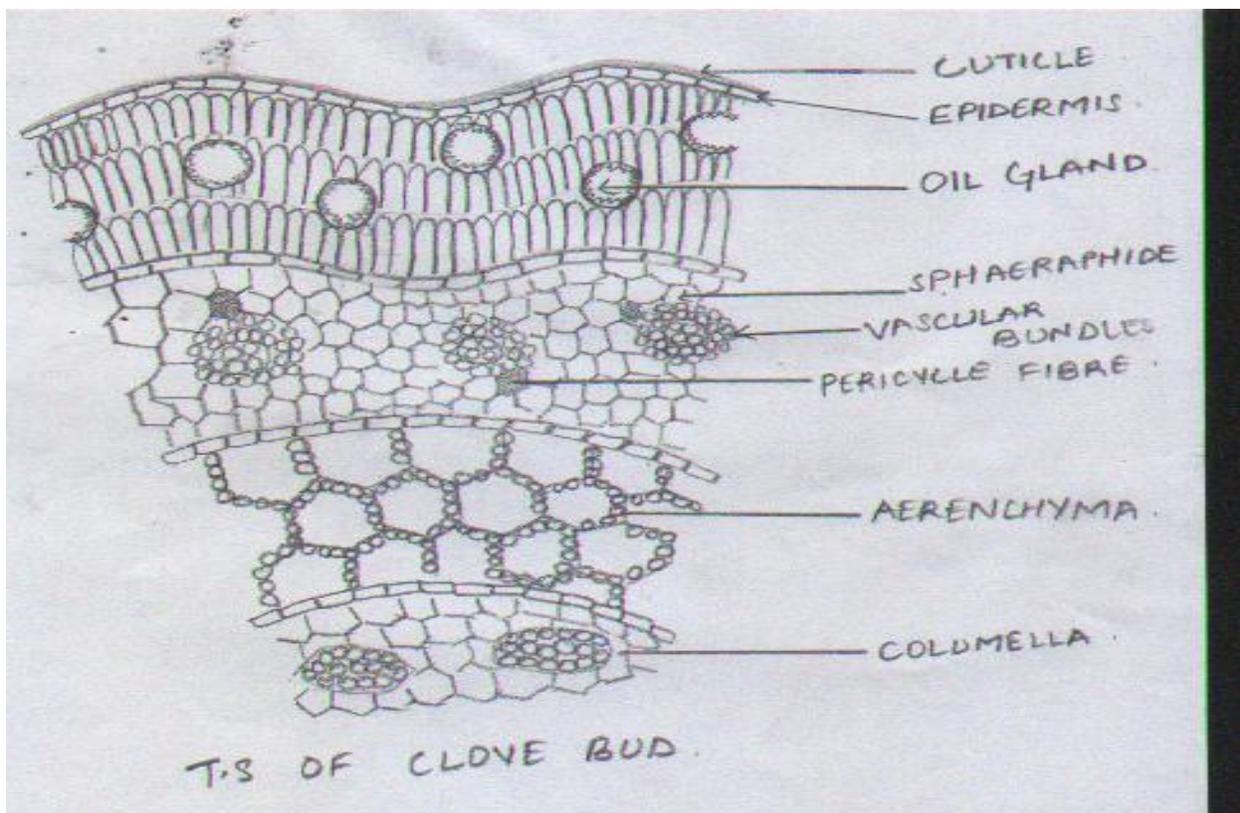
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Qd) Draw a well labeled T. S. diagram of clove along with its microscopy by giving four points.( 2 marks for T. S. diagram and 0.5 mark for each point of microscopy)

Ans.- Microscopy:

- 1) Epidermis- Single ;ayer straight walled cells with very thick cuticle.
- 2) Cortex
  - a) Outer zone- Radially arranged parenchymatous cells with 2 to 3 layers of big, ellipsoidal, schizolysogenous oil glands.
  - b) Inner region contains arenchymatous cells, having air spaces.
  - c) Columella- It contains parenchymatous cells, having calcium oxalate clusters, vascular bundles towards the periphery.





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**Q4 Attempt any three of the following;**

**Q. a) Explain in detail the scope of pharmacognosy.(1 mark for each point)**

**Ans.-**Pharmacognosy has a wide & broad scope in the field of pharmacy and its allied branches.

1) Cultivation & domestication of medicinal plants- India imports many drugs such as benzoin, storax, tolu balsam etc. If the cultivation of these drugs producing plants are carried out & cultivated in India, a lot of foreign exchange can be saved which will be helpful in the development of the country & is also essential to fulfill the demand of phytochemical industries.

2) Analysis of phytochemicals- Many bioactive molecules are extracted & isolated from the crude drugs. These are analysed by modern techniques such as different types of chromatography.

3) Preparation of general tonics & stimulants- There are number of diseases for which allopathic drugs have no cure for ex. Live disorders, arthritis, AIDS etc. Some of the ayurvedic formulations based on crude drugs are found very effective in these diseases .Ex. Liv.-52, livomin etc.

4)In steroid industry- Diosgenin is an important precursor obtained from Dioscorea species, used for production of steroidal drugs such as sex hormones, contraceptives, corticosteroids, etc.

5) Herbal preparation- generally 80% of the world population rely on herbal preparation , due to their high effectiveness, low cost, easy availability & less side effects.

6) Preparation of antibiotics-Antibiotics are very useful in maintaining the health of people are obtained from natural sources.

7) Flavouring agents & perfumes- There are large number of aromatic plants which are extensively used as flavouring agents, perfumes,in spices & medicines.



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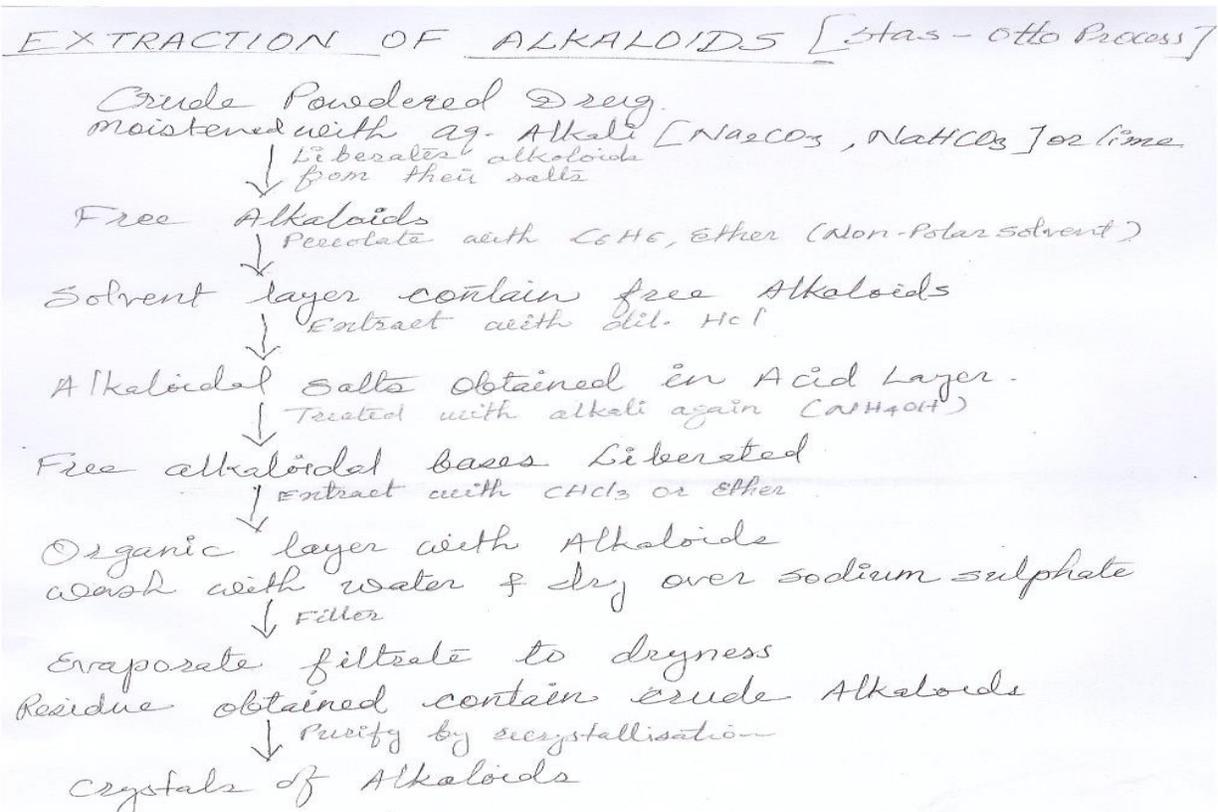
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8) Tissue culture- This technique is now a days widely applicable for the production of secondary metabolites. People are using this technique to increase the yield of bioactive molecules

**Q b).What are Alkaloids? Explain how the alkaloids are extracted from plants (1 mark for definition, 3 marks for steps for extraction)**

Alkaloids are basic nitrogenous organic compounds of plant origin, shows marked physiological action when administered internally. **OR**

These are organic products of natural or synthetic origin, which are basic in nature & contain one or more nitrogen atom, normally of heterocyclic nature & possess specific physiological action on human or animals.





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**Q. c) What do you mean by swelling factor? Describe how will you determine it? According to I.P. what should be the swelling factor for Isapgol? ( 1mark for explain swelling factor, 2 marks for procedure to determine, & 1mark for swelling factor I.P. range)**

**Ans-**Swelling factor of the drug is a quantitative swelling due to mucilage present in the drug. Swelling factor is supposed to be criterion of purity of the drug.

It is determined by putting 1gm. Of the drug in the measuring cylinder( 25ml capacity) in 20 ml water with occasional shaking. The volume occupied by the seeds after 24 hours of swelling is measured.

Swelling factor for Isapgol seeds is 10 to 14.

**Q. d) Write the biological source with family, chemical constituents and uses of Opium.(Bio. Source & Che. Constituents each carries 1.5 marks & 1 mark for uses)**

**Ans.-Biological source-** It consist of dried latex obtained from the unripe capsules of the plant, Papaver somniferum Linn, after making incision, belongs to family Papaveraceae.

**Chemical constituents-**Alkaloids-Phenanthrene nucleus: Morphine( 20%), Codeine (2%), Thebaine(1%)

Benzylisoquinoline nucleus: Papaverine(2%), Noscapine (narcotine) (5%) & Narceine

Morphine after Methylation converts into Codeine

Morphine after Acetylation converts into Heroine

**Uses-**Codeine & morphine used as Sedative & analgesics, smooth muscle relaxant, hence used in diarrhoea & abdominal cramping.

Codeine & its derivatives used as Antitussives

Papaverine relaxes involuntary smooth muscles & acts as spasmolytic



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Q.5 Attempt any three of the following :( 4 marks each)

a). Write minimum eight differentiating points between volatile oil and fixed oil.(1/2 marks –each point)

Volatile oil	Fixed oil
1. Evaporated at room temp.	1. Not evaporated at room temp
2. These do not produce permanent stain on paper	2. Do produce permanent stain on paper .
3.chemically these are terpenes and their oxygenated products .	3.Chemically they are fatty -acid with glycerol.
4. They are not saponified by alkali	4.They are saponified by alkali
5. Volatile oil do not have food value	5. Fixed oil have food value .
6. Volatile oil have pleasant odour, that's why used in perfumery ,cosmetics, soaps ,incense sticks, food and pharmaceutical industries etc	6. Fixed oil does not have pleasant odour
7. They do not turn rancid on storage.	7. They turn rancid on storage due to free acidity
8.Hydrogenation is not possible	8.Hydrogenation is possible
9.Specific gravity is less than or more than one	9.Specific gravity is generally less than one
10. Volatile is obtained by distillation . e.g. Orange oil,Lemon oil	10.If distilled it gets decomposed e.g. Arachis oil,Castor oil



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**b) Write biological source with family of Rauwolfia. Describe method of collection and preparation of Rauwolfia for market.**

**(Biological source-1 mark, collection and preparation of Rauwolfia-3 marks)**

Biological Source. - It consist of dried roots of the plant Rauwolfia serpentine

,Family – Apocynaceae

Collection :Rauwolfia roots are harvested during autumn from 3-4 years old plant ,as it consists of higher proportion of alkaloids during winter ,When the shrub is about 1m in height with white or rose coloured flowers and purplish black fruits and plants are about 3-4 years ,the roots which penetrate the soil deeply are digging out ,washed properly so as to remove earthy matter and dried by natural drying process, store in well closed container. Care is taken to keep the root bark intact as the bark has higher alkaloidal content.

**c) Define the term diuretics and carminatives with two examples from each category.**

**(Definition -1 mark each, any 2 example of each term,1/2 mark each example)**

Diuretics-Diuretics are drugs which increases the flow of urine OR secretion of urine or increases the quantity of urine.

e.g.Gokhru,Punarnava

Carminatives –Carminatives are the drugs that expel gases from the gastrointestinal tract by increasing peristalsis.

e.g Fennel,Coriander,AjowanAsafoetida ,Ginger ,Nutmeg,Clove,cardamom ,Cinnamon



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**d) Write in detail methods of isolation of volatile oils.( 1 mark for each method)**

Methods of extraction:

1. Distillation Method
2. Solvent Extraction
3. Ecuelle Method
4. Enfleurage Method

**1. DISTILLATION**

Most of the oils are obtained by distillation which are of following 3 types

1. water distillation
2. Direct steam distillation

1. water distillation -is mostly applicable to such plant material, which is dried initially in air and the constituents are not degraded by boiling upto  $100^{\circ}\text{C}$  e.g Turpentine oil, Clove oil

2..Direct steam distillation- it is invariably applicable to fresh drugs that is loaded with sufficient natural moisture and hence no maceration is required e.q. peppermint oil, Rose oil

**B) Solvent Extraction**

Extraction is done by using some organic solvents like ether, benzene, petroleum etc.

**C) Ecuelle Method**

In this method the oil cells of the citrus fruits are ruptured using pointed projections by twisting raw material over them in clockwise direction either mechanically or manually e.g. citrus oil.



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D) Enfleurage Method:- it is used in the extraction of delicate perfumes. The fresh flower petals are spread on a fatty material. The spread petals are exhausted after sometime as the fatty material absorbs the oil. These exhausted petals are replaced by fresh petals and then the oil is collected from the fatty material.

**Q.6 Explain chemical tests of following any four crude drugs ( 3 marks for chemical tests of each drug)**

**i) Starch:(3 marks for each test,any three)**

1. 1gm of starch is boiled with 15ml of water and cooled, a translucent viscous jelly is produced.

2. Above jelly turns deep blue by addition of iodine solution. This blue color disappears on warming and reappears on cooling.

3. Hydrolyse the starch solution with acid and then add Fehling's solution A and Fehling's solution B in equal quantity and heat it in water bath which gives brick red ppt.

4. To the solution of starch add Molisch reagent and add  $H_2SO_4$  from the side of test tube.

**ii) Shark liver oil (1 ½ mark each test)**

1. Dissolve 1 gm of Shark liver oil in 1ml of Chloroform and treat with 0.5 ml of  $H_2SO_4$ . It acquires light violet colour changing to purple and finally to brown due to Vit. A

2. Dissolve the drug in 10 ml of Chloroform and treat with saturated solution of antimony trichloride in chloroform, Shake it well, A blue color is developed due to Vit A

**iii) Turmeric: (3 marks for each test,any three)**

i) Powdered drug with sulphuric acid gives crimson colour.

ii) Aqueous solution of drug with boric acid produce reddish colour which on addition of alkali changes to greenish blue.



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iii) With acetic anhydride & conc. sulphuric acid, it gives violet colour. This test under UV light red fluorescence is seen.

iv) Prepare tincture of turmeric & impregnate a filter paper with it. Treat same paper with borax solution, green colour is produced.

v) With alkali turmeric gives red colour.

**iv) Datura: (1 ½ mark each test)**

1. **Vitali- Morin Reaction:** The tropane alkaloid is treated with fuming nitric acid, followed by evaporation to dryness and addition of methanolic potassium hydroxide solution to an acetone solution of nitrated residue. Violet colouration takes place due to tropane derivatives.

2. On addition of silver nitrate solution to solution of hyoscyne hydrobromide, yellowish white precipitate is formed, which is insoluble in nitric acid but soluble in dil. Ammonia.

**v) Acacia: (3 marks for each test, any three)**

1. Solution of Lead sub acetate gelatinized aq. solution of acacia.

2. Acacia does not produce pink colour with ruthenium red.

3. An aq. Solution of acacia when treated with  $H_2O_2$  and benzidine in alcohol produces a blue colour due to Oxidase Enzyme.

4. An aq solution of acacia is boiled with dil HCl acid. After cooling Fehlings solution A and B are added, a red ppt is produced

5. To an aq. Solution of acacia add N/50 iodine solution does not produce crimson red colour.



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**vi) Digitalis : (3 marks for each test,any three)**

1. Kellar Kellani Test:-Boil 1 gm powder drug with 10ml of 70% alcohol for 3mins and filter it. To the filtrate add 5ml of water and 0.5ml of strong solution of lead acetate. Filter it .the filtrate is treated with equal volume of chloroform and shake it. Chloroform layer is separated and evaporated to obtain residue. Then the extract which is obtained is dissolved in glacial acetic acid and cooled. Add 2 drops of ferric chloride soln to it. Transfer the above contents to a test tube containing 2ml of conc. Sulphuric acid, a reddish brown layer acquires bluish green colour after standing due to digitoxose.

2. Baljet Test:- A thick section of Leaves with Sodium Picrate solution shows yellow orange colour.

3. Regals Test:- Dissolve the drug in 2ml of pyridine, 2ml add sodium nitroprusside soln, make alkaline with sodium hydroxide soln. It gives pink red color.